



High data rate and short-range 60GHz wireless communication and its applications

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STMicroelectronics

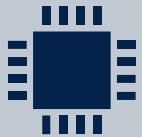


ST60 : a new solution for contactless connectivity

High-speed, low-power, short range, point to point 60 GHz RF link



Up to 6.25 Gbps



Small Footprint



Short-range



Connector-free solutions



Ultra low power



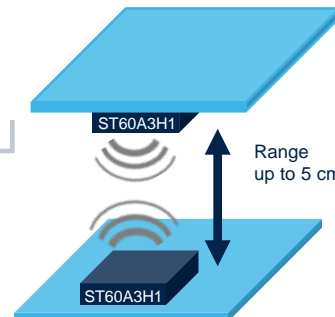
-40°C to 105°C



No pairing needed



Rotation support

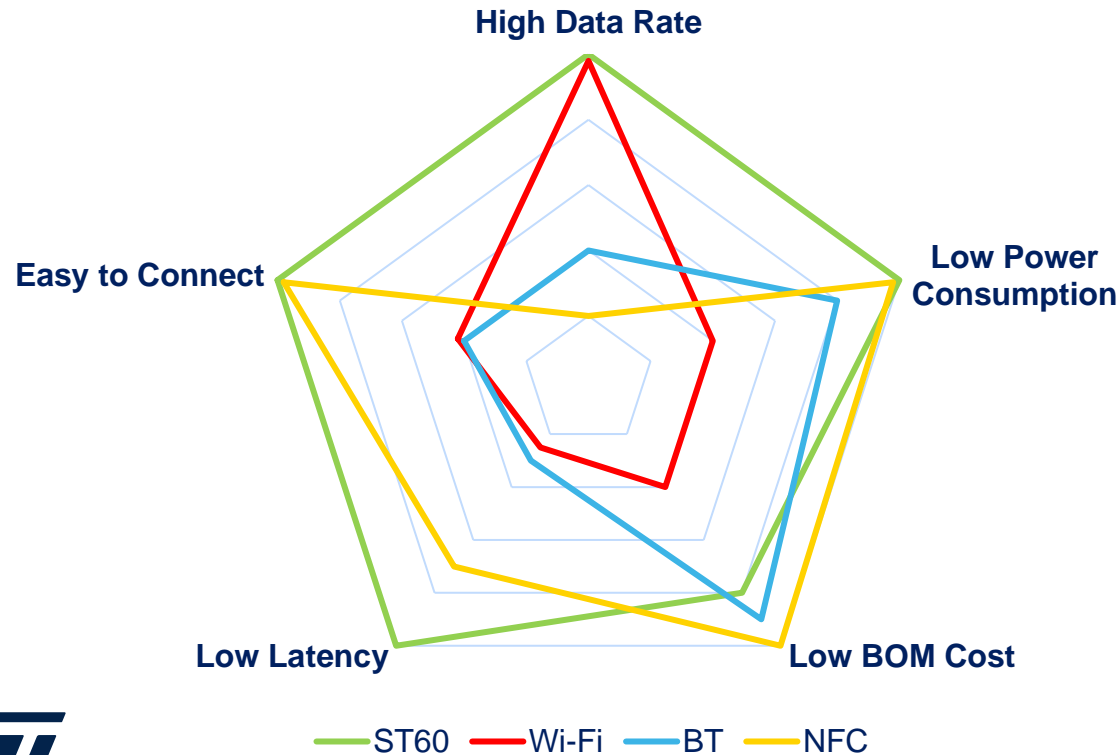




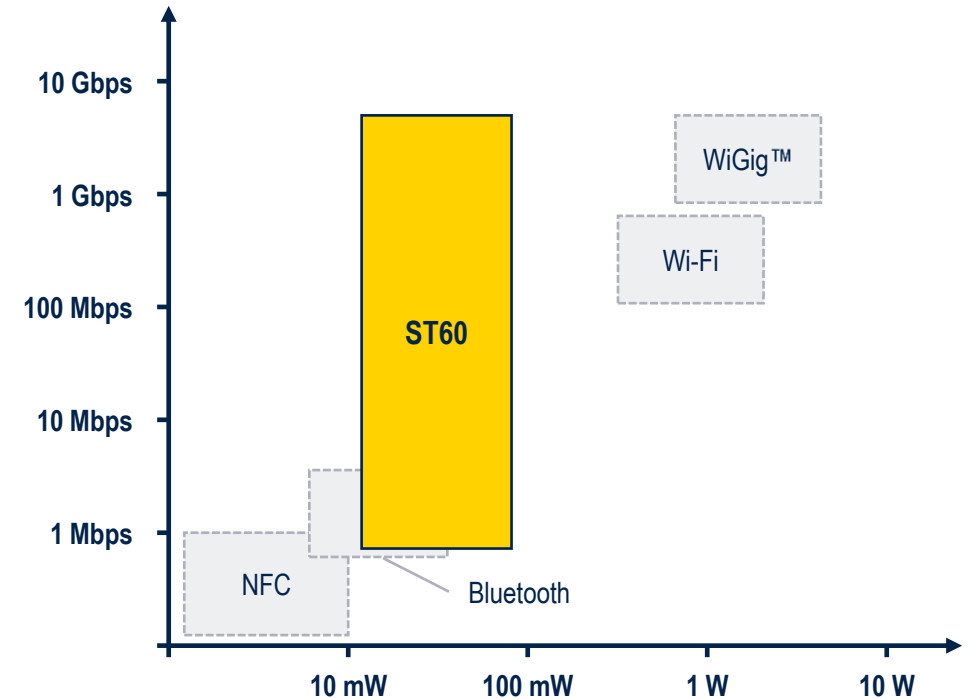
Introducing ST60 60 GHz contactless connectivity

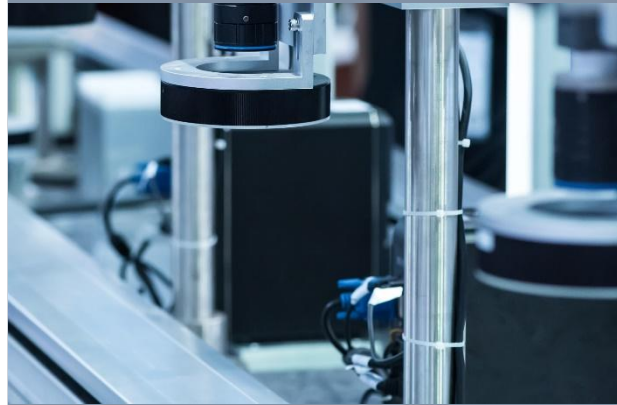
ST60 Benefits: Extreme Speed performance, up to 6 Gbps at very Low-Power, small Form Factor, ease of integration

ST60 versus other wireless technologies



Industry Best Power per Bit 8.9 pJ/bit for Tx & 6.4 pJ/bit for Rx





Electronic appliance

Factory automation

Robotics

Accessories & modular devices (camera, etc.)

Low data rate transfer (up to 480 Mbps)
Automation, debug, and firmware transfer. Safe & reliable rotation

High data rate transfer (up to 6 Gbps)
Ethernet, video, camera, robotics. Safe & reliable rotation

Slipring / Lidar applications

Personal electronics (Docking / firmware transfer)

Industrial safety

Video walls

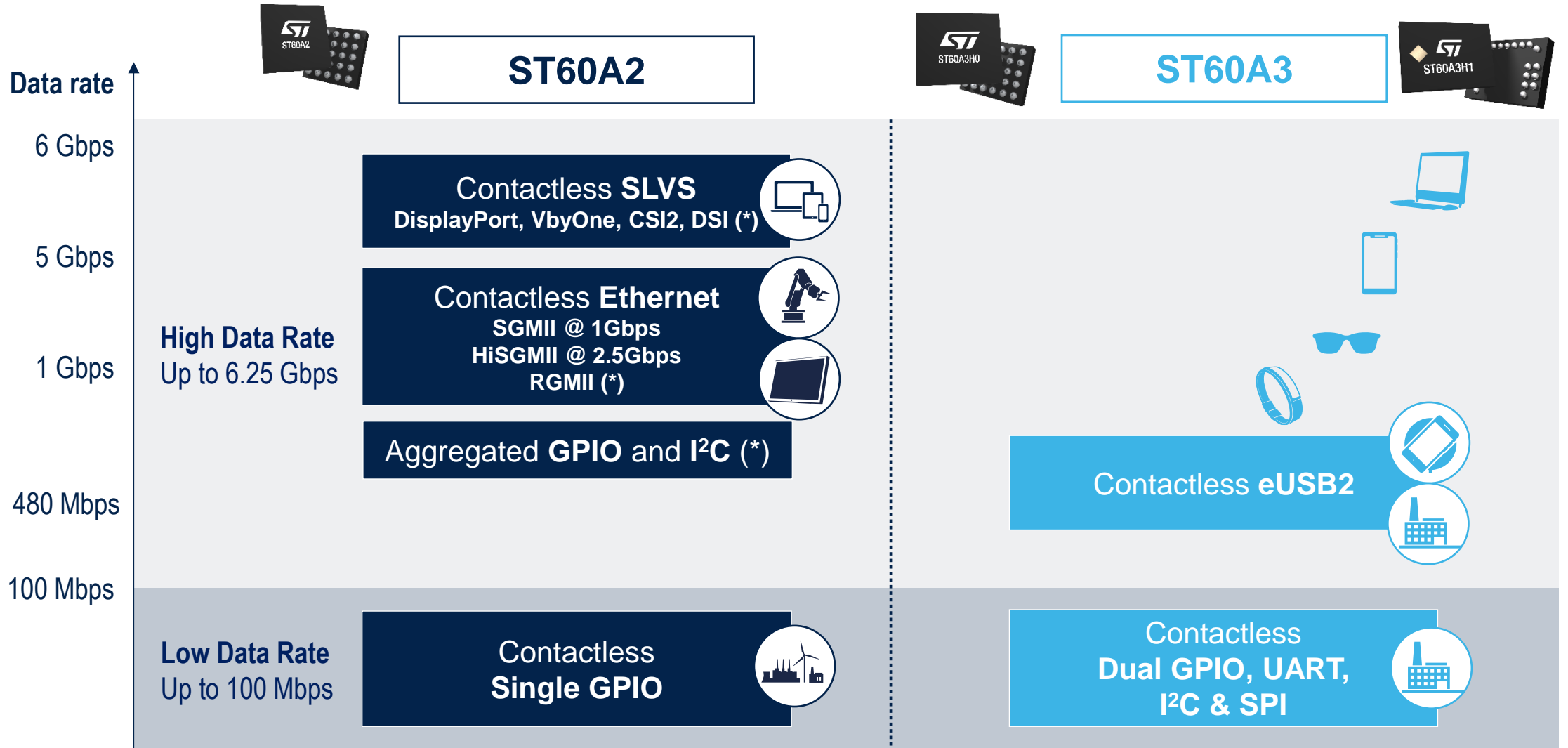


ST60 Family presentation





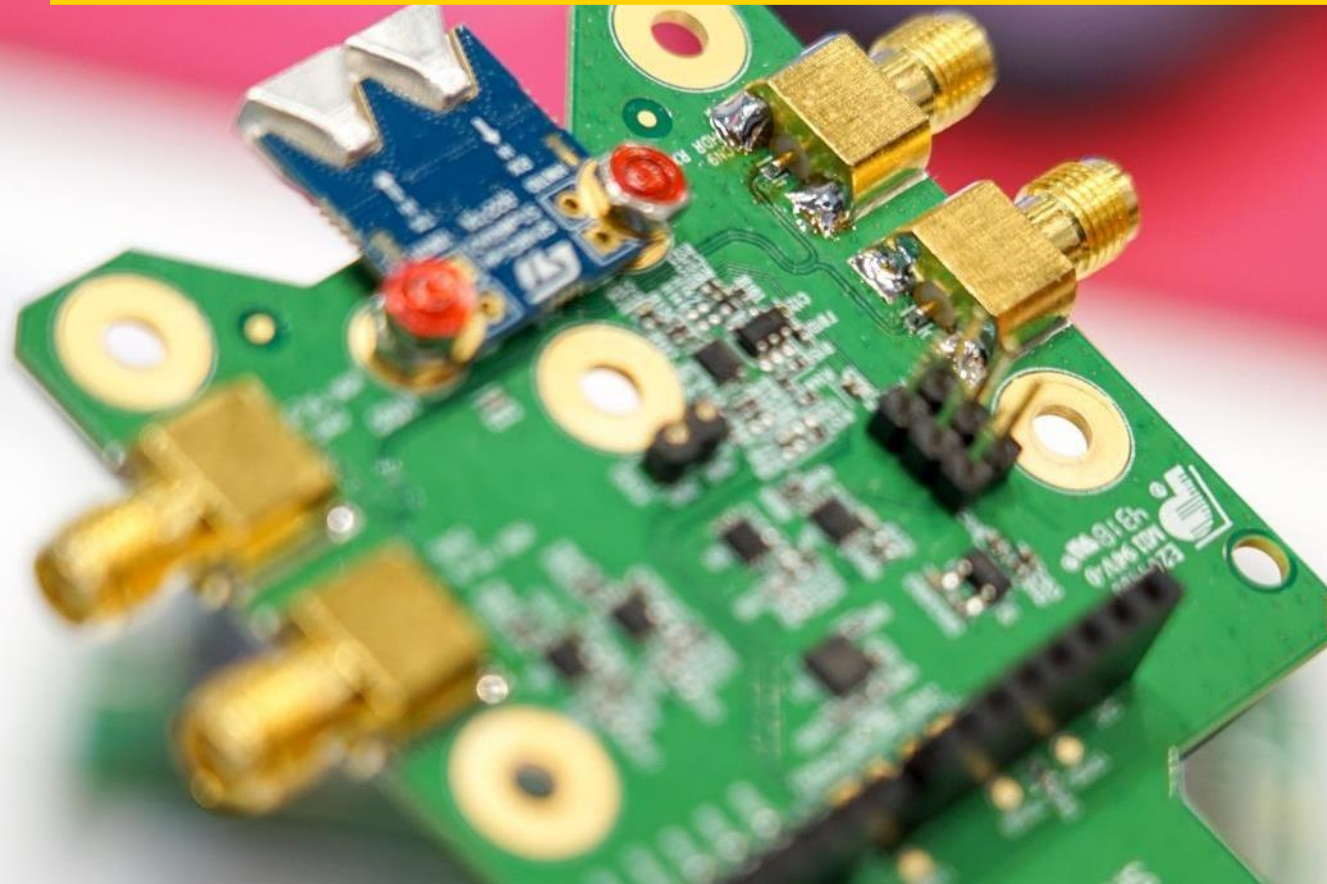
ST60 Portfolio – Applications



(*) leveraging companion chips / serializer



ST60A2 product overview and applications





ST60A2 overview

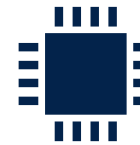
Compact solution integrating full 60 GHz RF transceiver
up to 6.25 Gbps



Point to Point
Short range
Half Duplex



Up to 6.25 Gbps



Small Footprint



Ultra low power



-40°C to 105°C



Flexible antenna configurations





Full/High Data Rate modes: FDR/HDR

- SLVS differential input-output port (Tx/Rx)
- Need DC balanced data 8b/10b coded
- FDR mode: from 1 Mbps to 5 Gbps
- HDR mode: from 500 Mbps to 6.25 Gbps
- Typical interfaces:
 - LVDS (need level adaptation)
 - 1 Gbps Ethernet with SGMII PHY
 - 2.5 Gbps Ethernet with Hi-SGMII PHY
 - MIPI CSI/DSI, DisplayPort, VbyOne with companion IC

Low Data Rate mode: LDR

- Single-ended CMOS IO: from 9.6 kbps to 100 Mbps
- Typical interfaces: UART, GPIO



ST60A2 operating modes



Contactless Gigabit Ethernet Bridge (SLVS/HDR)



Contactless Fast GPIO (GPIO/LDR)

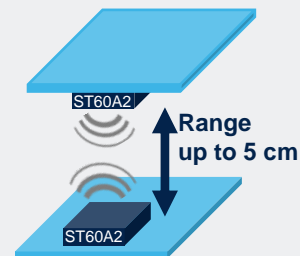


ST60 for Contactless Connectivity Video Wall and Screens extender



ST60A2

-  High Data Rate
-  No wire
-  Ultra low power
-  Small Footprint



Benefits

- Easy setup and replacement without entangling cables
- Supports Display Port, VbyOne, CSI2, DSI with companion ICs

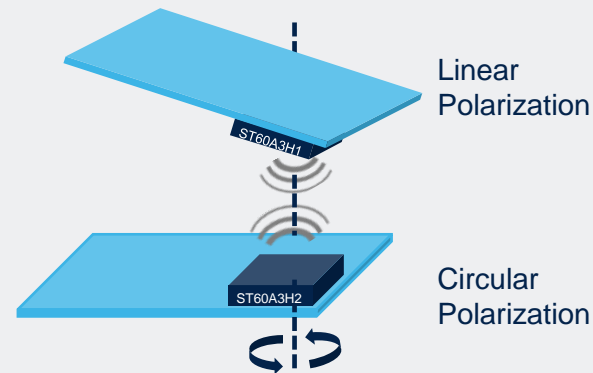


ST60 for Contactless Connectivity Surveillance Camera, Gimbal and Drones



ST60A2/3

- 🕒 High Data Rate
- 📶 No wear & tear
- ⚡ Ultra low power
- 📦 Small Footprint



Benefits

- 360° rotation vs traditional slip rings
- Improves **reliability** vs connectors/contact pins wear & tear
- High Data Rate supports HD Video
 - No pairing needed
 - **ST60A3**: 480 Mbps eUSB2 data transfer (pictures, data)
 - **ST60A2**: DisplayPort, VbyOne, CSI2, DSI



ST60 Contactless Ethernet

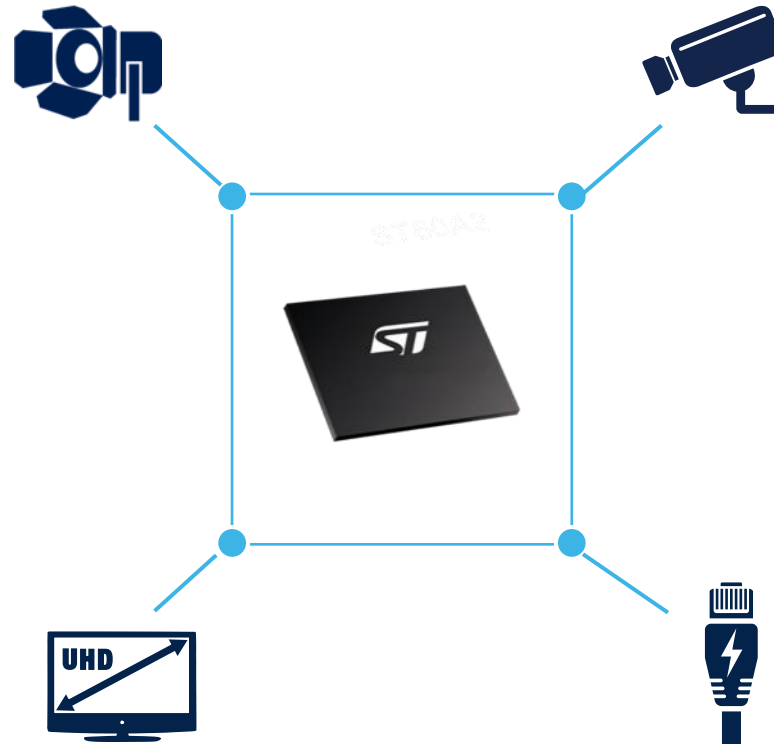
Native Ethernet SGMII interface with management of broken links

Factory Automation

- Full 360° motion enablement
- Machinery sealed and resistant to corrosive elements (no connectors)
- Hot swap modular equipment
- Fast field updates
- EMI Resistant

Video Walls and Displays

- Make LED panels plug and play
- Reduce installation cost
- Make hermetically sealed displays
- Reduce the solution cost by eliminating number of CAT5 cables, RGB connectors, SPI connectors



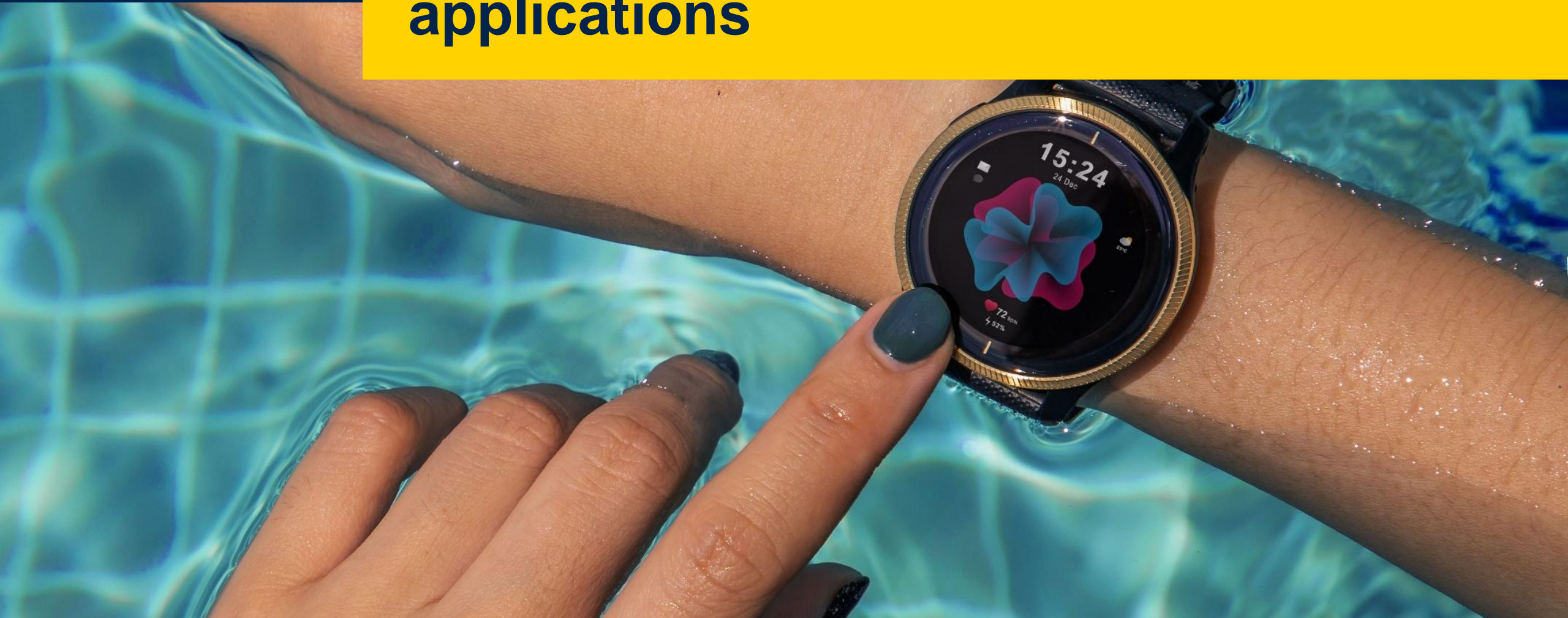
Industrial and Security Cameras

- Make cameras more compact
- Eliminate reliability issues with cable rotations
- Plug and play modules

Ethernet Connectors

- Replace costly IP6x connectors
- Eliminate Ethernet PHY and magnetics from one side of link
- Make Ethernet connections modular & sealed

ST60A3 product overview and applications





ST60A3 – Overview

60 GHz V-Band transceiver for contactless connectivity up to 480 Mbps



Contactless eUSB2 | UART | I²C | GPIO

Antenna in package (AiP)

3 x 4 x 0.8 mm package



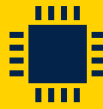
Contactless eUSB2 | UART | I²C | GPIO

External antennas – Rotation support


2.2 x 2.6 x 0.8 mm package



 Up to 480 Mbps wireless connectivity (eUSB2)

 Small footprint with integrated antenna (ST60A3H1)
Flexible antenna configurations (ST60A3H0)

 Ultra low power

 Temperature range [-20 , +85°C]



ST60A3H1 – Overview

60 GHz V-Band transceiver for short range contactless connectivity up to 480 Mbit/s with linear polarization antenna in package



- Full RF transceiver and linear polarization antenna (AiP), operating in half-duplex mode
- 42 dB typical total link budget, up to 5 cm free-space propagation loss
- eUSB2, UART, GPIO, or I²C RF tunneling
- Single 1.8 V supply
- Low power consumption (typical values with single 1.8 V supply):
 - eUSB2 Rx / Tx – 110 / 130 mW
 - UART / GPIO / I²C – 90 mW
 - Standby – 23 μ W
- Optimized BOM without external matching network and clock references
- Package: VFBGA 2.9 mm x 4.1 mm x 0.8 mm





ST60A3 – Functional overview

- **Fully integrated transceiver**

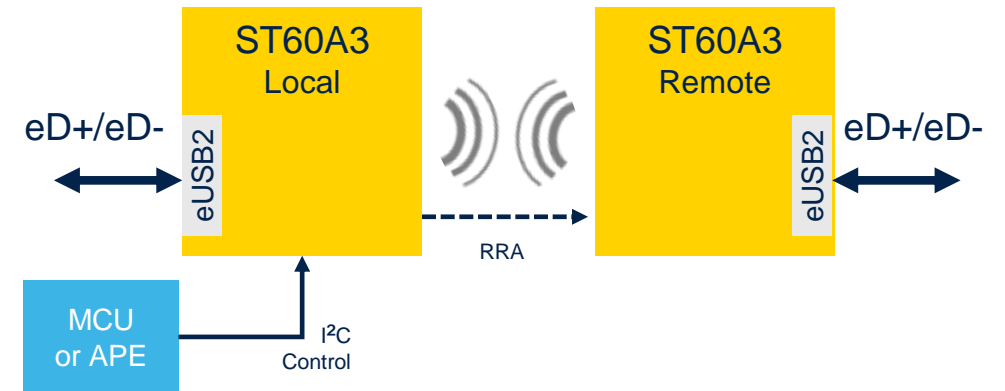
- The I²C configuration bus and Hardware Control Pins configure and manage the transitions of the ST60A3.
- No need for external antenna since integrated in package.

- **Power efficient behavior**

- In Standby mode, RF is disabled. Power consumption is a few μW .
- Once RF is enabled, both ST60A3 will enter a discovery state. Remote power consumption is few μW .
- When a partner is detected, the RF link is established, and the 2 devices enter in low power mode. Power consumption is in the range of $100\mu\text{W}$.

- **Simple integration within application**

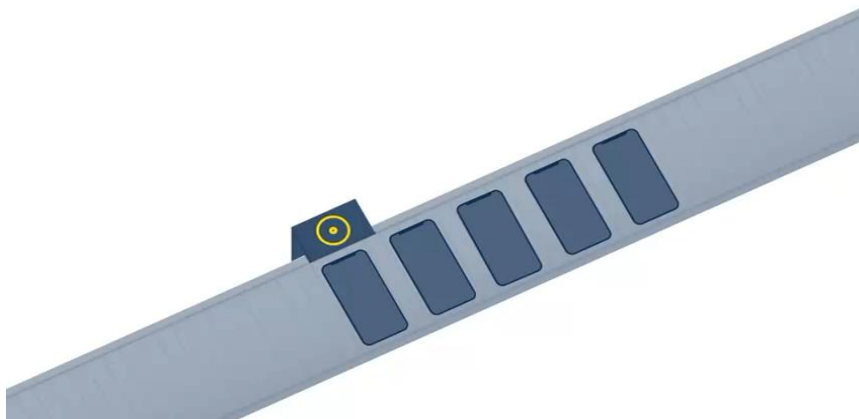
- In low power mode, the Local ST60A3 is configured by I²C.
- The Remote ST60A3 is either configured by I²C, or Over-the-air by Remote Register Access (RRA) over the RF link.
- An I²C command to the Local device will then set the pair of ST60A3 in the desired tunneling mode (eUSB2, UART, I²C or GPIO).



Wireless eUSB2 bus with data rate up to 480 Mbps

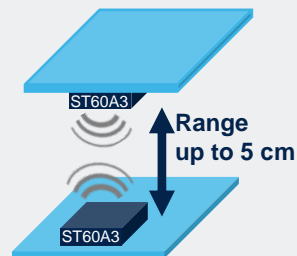


ST60 for Contactless Connectivity FOTA for AR/VR and Smart Watches



ST60A3

-  High Data Rate
-  No wear & tear
-  Ultra low power
-  Small Footprint



Benefits

- **Portless and water-proof** design
- Faster production throughput
 - **No pairing** vs Wi-Fi/Bluetooth
 - Improves **reliability**
- **Higher FOTA** speed
 - 480 Mbps eUSB2 (pictures, data)
 - 5 Gbps Ethernet possible
- Simple access for **SW loading** and testing before and after housing

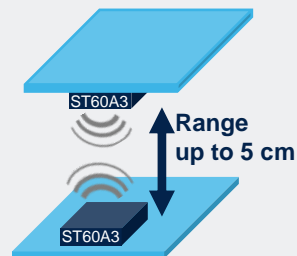


ST60 for Contactless Connectivity Smart Docking



ST60A3

-  High Data Rate
-  No wear & tear
-  Ultra low power
-  Small Footprint



Benefits

- **Portless** and **water-proof** design
- Instant sync, **no pairing** required
- Fully compatible with **wireless charging**
- 480 Mbps **eUSB2** (pictures, data)
- Higher security





ST60 for Contactless Connectivity Robotics Arm

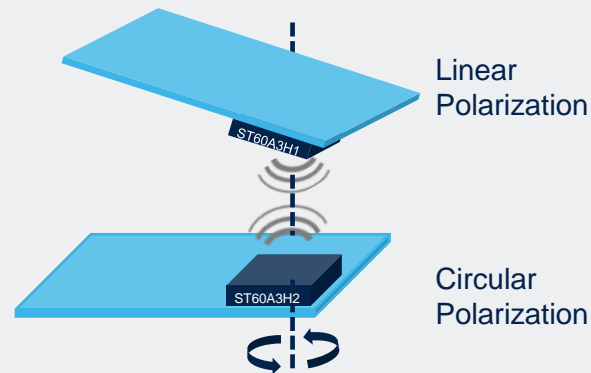


<https://www.rosenberger.com/product/roproxcon-contactless/>



ST60A2/3

-  High Data Rate
-  No wear & tear
-  Ultra low power
-  Small Footprint



Benefits





- 360° rotation vs traditional slip rings
- Improves **reliability** vs connectors/contact pins wear & tear
- High Data Rate supports HD Video
 - No pairing needed
 - **ST60A3**: 480 Mbps eUSB2 data transfer (pictures, data)
 - **ST60A2**: Ethernet, DisplayPort, VbyOne, CSI2, DSI

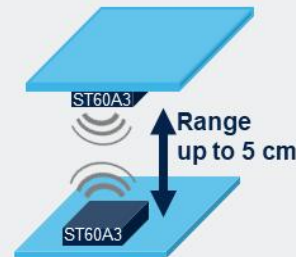


ST60 for Contactless Connectivity Rugged Mobile devices



ST60A3

-  High Data Rate
-  No wear & tear
-  Ultra low power
-  Small Footprint

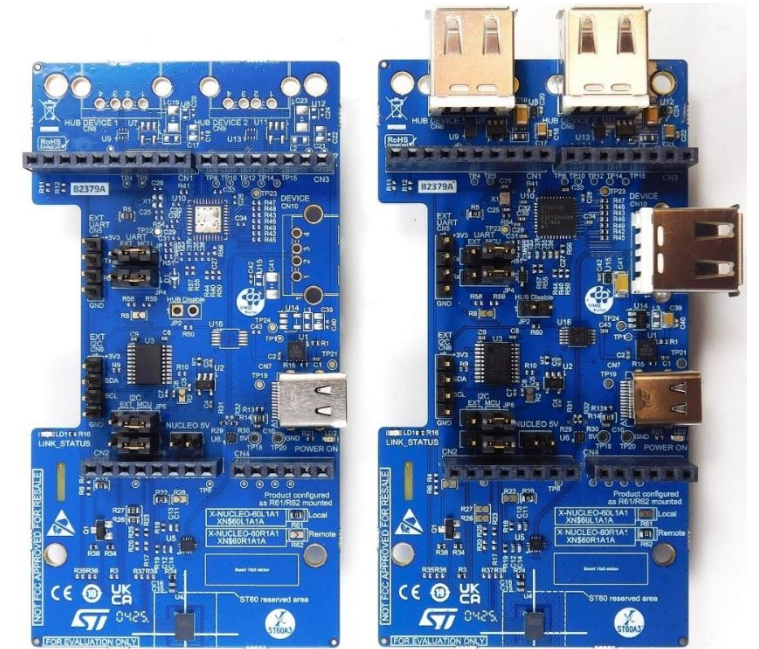


Benefits

- **Portless** and **water-proof** design
- No disconnection in **harsh&vibrating** environment vs pogo pins
- Fully compatible with **wireless charging**
- 480 Mbps **eUSB2** (pictures, data)
- Higher security

ST60 X-Nucleo extension pack: X-NUCLEO-60K1A1

- Kit composed of two boards:
 - X-NUCLEO-60L1A1 - Local
 - X-NUCLEO-60R1A1 - Remote
- STM32 Nucleo mandatory on X-NUCLEO-60L1A1
- USB2, UART and I²C contactless communications examples
- FW use STM32Cube X-CUBE-ST60 Expansion package

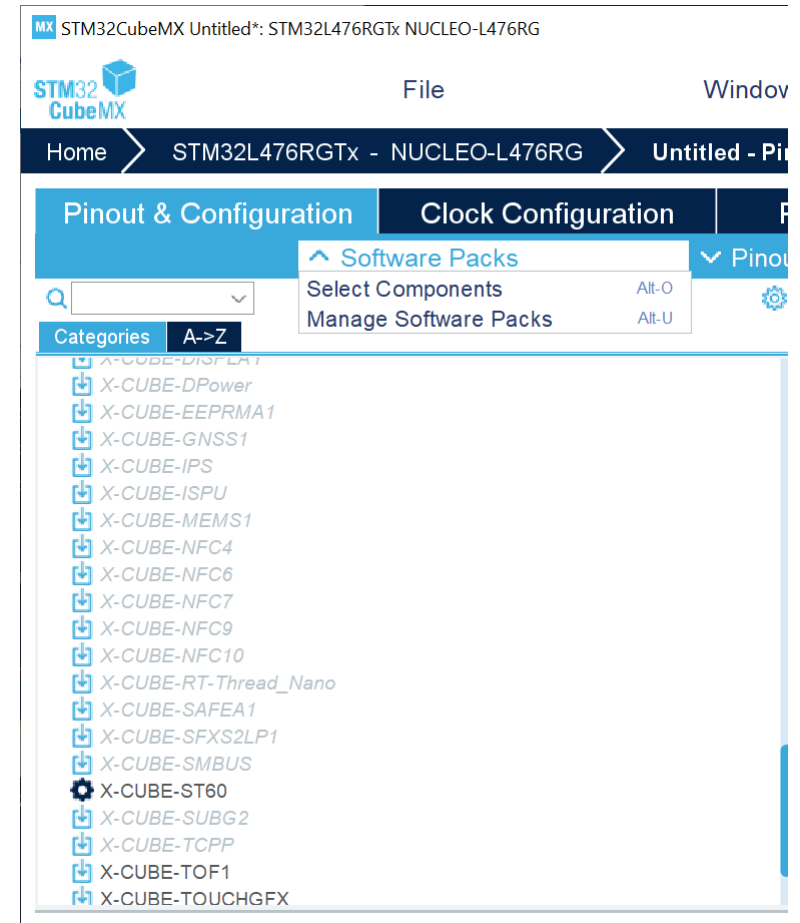


You will find more information on ST website:

[X-NUCLEO-60K1A1 - Expansion board kit based on the ST60A3H1 for STM32 Nucleo - STMicroelectronics](#)

X-CUBE-ST60 software extension pack for X-NUCLEO-60K1A1

- STM32Cube Expansion Pack for ST60A3H1 contactless connectivity transceiver:
 - X-NUCLEO-60L1A1 and X-NUCLEO-60R1A1 BSP driver
 - ST60A3H1 Component Driver
 - For X-NUCLEO-60L1A1, complete examples :
 - ST60A3H1 configuration for eUSB2, UART or I²C contactless communications
 - USB2, UART and I²C contactless communications examples
 - For X-NUCLEO-60R1A1, complete examples :
 - no ST60A3H1 configuration (It is done from X-NUCLEO-60L1A1)
 - UART and I²C contactless communications examples
- Easy portability across different MCU families, thanks to STM32Cube
- Free, user-friendly license terms.



You will find more information on ST website:

[X-CUBE-ST60 – X-NUCLEO-60K1A1 software expansion for STM32Cube - STMicroelectronics](#)

Our technology starts with You



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